

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (currently amended) A universal fin for use in a fin on tube heat exchanger, the universal fin comprising:

a sheet of heat conducting material configured to be separated to form one or more continuous fins for use on the fin on tube heat exchanger regardless of a number of vertical and horizontal pairs of tubing segments in said heat exchanger, said sheet having a width and a height; and

a plurality of openings in said sheet, each of said openings configured to allow a pair of generally parallel tubing segments of the heat exchanger to pass therethrough, each of said openings being canted relative to said width and height of said sheet, each of said openings being arranged on said sheet into a plurality of rows and into a plurality of columns with adjacent rows being generally equally spaced apart and with adjacent columns being generally equally spaced apart, and said spacing between adjacent rows and between adjacent columns being dimensioned to allow said sheet to be separated between at least one of said adjacent rows and said adjacent columns to form one or more continuous fins each containing a plurality of openings at least equal to a total number of pairs of tubing segments in the heat exchanger.

2-3. (cancelled).

4. (original) The universal fin of claim 1, further comprising indicia on said sheet indicating locations where said sheet can be separated to form said fins, said indicia extending along said sheet between at least one of said columns and said rows.

5. (original) The universal fin of claim 4, wherein said indicia is perforations in said sheet.

6. (currently amended) The universal fin of claim 1, wherein said columns are spaced apart such that a portion of said openings in one of said columns overlaps a portion of said openings in an adjacent column and having an undulating edge.

7. (cancelled)

8. (original) The universal fin of claim 1, wherein said spacing between adjacent rows is generally equal to said spacing between adjacent columns.

9. (cancelled)

10. (currently amended) A fin on tube heat exchanger having a fin formed from a universal fin sheet, the heat exchanger comprising:

a tube portion having a plurality of straight segments of tubing interconnected by a plurality of connecting segments of tubing with each connecting segment interconnecting two straight segments, said straight and connecting segments being arranged in a sinuous configuration, said tube portion having a known quantity of vertical and horizontal pairs of tube passes; and

at least one continuous fin on said tube portion, said continuous fin being separated from a universal fin sheet having a width, a height and a plurality of openings with each opening configured to allow a pair of tube passes to pass therethrough, each of said openings being arranged on said universal fin sheet into a plurality of rows and into a plurality of columns with adjacent rows being generally equally spaced apart and with adjacent columns being generally equally spaced apart, and said spacing between adjacent rows and between adjacent columns being dimensioned so that said universal fin sheet can be separated between at least one of said adjacent rows and adjacent columns to form said continuous fin having a quantity of openings at least equal to said number of pairs of tube passes regardless of a number of vertical and horizontal pairs of tube passes in said tube portion,

wherein said continuous fin has a quantity of said openings at least equal to said number of pairs of tube passes in said tube portion and said continuous fin is arranged on said tube portion with each pair of tube passes of said tube portion passing through one of said openings in said continuous fin.

11. (original) The heat exchanger of claim 10, wherein said tube portion is a single continuous tube.

12. (original) The heat exchanger of claim 10, wherein said at least one fin is one of a plurality of fins and said plurality of fins are aligned in a generally parallel configuration with said openings in said fins being aligned to form a fin bank that is arranged on said tube portion.

13. (original) The heat exchanger of claim 10, wherein said tube portion has more vertical tube passes than horizontal tube passes.

14. (original) The heat exchanger of claim 10, wherein said tube portion has more horizontal tube passes than vertical tube passes.

15. (cancelled)

16. (original) The heat exchanger of claim 10, wherein said spacing between adjacent rows is generally equal to said spacing between adjacent columns.

17. (cancelled)

18. (original) The heat exchanger of claim 10, wherein said columns of said universal fin sheet are spaced apart such that a portion of said openings in one of said columns overlaps a portion of said openings in an adjacent column and said fin has an undulating edge.

19. (currently amended) A method of making a fin on tube heat exchanger, the method comprising the steps of:

(a) separating at least one continuous fin having a predetermined quantity of openings from a preformed universal fin sheet that is configured to be separated to provide one or more continuous fins for use on a heat exchanger regardless of a number of vertical and horizontal pairs of tube passes in a tube portion of the heat exchanger on which said at least one continuous fin is to be used, said universal fin sheet having a plurality of columns and a plurality of rows of openings configured to allow a pair of tube passes to pass therethrough; and

(b) positioning said continuous fin on said tube portion of said heat exchanger with pairs of tube passes passing through said openings.

20. (currently amended) The method of claim 19, wherein (a) includes ~~performing said universal fin sheet so that said~~ separating said at least one continuous fin from a universal fin sheet ~~[[has]]~~ having a width, a height and a plurality of openings with each opening configured to allow a pair of tube passes of the heat exchanger to pass therethrough, each of said openings being arranged on said universal fin sheet into a plurality of rows and into a plurality of columns with adjacent rows being generally equally spaced apart and with adjacent columns being generally equally spaced apart, and said spacing between adjacent rows and between adjacent columns being dimensioned so that said universal fin can be separated between at least one of said adjacent rows and adjacent columns to form said at least one fin regardless of a number of horizontal and vertical pairs of tube passes.

21. (currently amended) The method of claim ~~[[20]]~~ 31, wherein performing said universal fin sheet includes placing indicia on said universal fin sheet between at least one of said columns and said rows, said indicia indicating locations where said universal fin sheet can be separated to form said at least one fin.

22. (cancelled)

23. (currently amended) The method of claim ~~[[20]]~~ 31, wherein ~~[[a)]]~~ performing said universal fin sheet includes die stamping said universal fin sheet from a sheet of heat conducting material.

24. (cancelled)

25. (original) The method of claim 19, further comprising forming a tube portion having a predetermined number of vertical and horizontal pairs of tube passes.

26. (original) The method of claim 25, wherein forming said tube portion includes forming said tube portion with a greater number of horizontal pairs of tube passes than vertical pairs of tube passes.

27. (original) The method of claim 25, wherein forming said tube portion includes forming said tube portion with a greater number of vertical pairs of tube passes than horizontal pairs of tube passes.

28. (original) The method of claim 25, wherein forming said tube portion includes bending a continuous length of tubing so that said tubing forms said tube portion.

29. (original) The method of claim 19, wherein (a) includes cutting said at least one fin from said preformed universal fin sheet.

30. (original) The method of claim 19, wherein portions of openings in one column overlap portions of openings in an adjacent column and said fin has an undulating edge.

31. (new) The method of claim 20, further comprising preforming said universal fin sheet.

32. (new) A method of assembling fin on tube heat exchangers having differing numbers of horizontal and vertical tube passes using substantially identical universal fin sheets, the universal fin sheets each having a plurality of columns and rows of openings configured to allow a pair of tube passes to pass therethrough, the method comprising:

(a) separating a plurality of first continuous fins having N_1 columns and M_1 rows of openings from the universal fin sheets, N_1 and M_1 being positive integers greater than 1; and

(b) positioning said first continuous fins on a first tube bundle with tube passes passing through said openings;

(c) separating a plurality of second continuous fins having N_2 columns and M_2 rows of openings from the universal fin sheets, N_2 and M_2 being positive integers greater than 1 and at least one of N_2 and M_2 being different than N_1 and M_1 , respectively, and

(d) positioning said second continuous fins on a second tube bundle with tube passes passing through said openings.

33. (new) The method of claim 32, wherein (b) includes positioning said first continuous fins on a first tube bundle having N_1 pairs of horizontal tube passes and M_1 pairs of vertical tube passes and (d) includes positioning said second continuous fins on a second tube bundle having N_2 pairs of horizontal tube passes and M_2 pairs of vertical tube passes.

34. (new) The method of claim 33, wherein both N_1 and M_1 are different than N_2 and M_2 , respectively.

35. (new) The method of claim 32, wherein (a) and (c) include, respectively, separating said first and second continuous fins from universal fin sheets having equally spaced apart columns of openings and equally spaced apart rows of openings.

36. (new) The method of claim 35, wherein (a) and (c) include, respectively, separating said first and second continuous fins from universal fin sheets having equally spaced apart columns of openings and equally spaced apart rows of openings having a spacing substantially the same as said spacing between the columns.

37. (new) The method of claim 32, further comprising forming the universal fin sheets.

38. (new) The method of claim 32, further comprising forming said first and second tube bundles.